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Designing a Better Matrix for Solidification/Stabilization of Hazardous Waste with the Aid of Bagasse (Lignin) as a Polymer Additive to Cement

Michael A. Janusa
janusama@sfasu.edu

203. DESIGNING A BETTER MATRIX FOR SOLIDIFICATION/STABILIZATION OF HAZARDOUS WASTE WITH THE AID OF BAGASSE (LIGNIN) AS A POLYMER ADDITIVE TO CEMENT. Michael A. Janusa, Jeffrey C. Bourgeois, Nicole M. Kliebert, Dant A. Sandras, Department of Physical Sciences, Nicholls State University, Thibodaux, Louisiana, 70310

A significant portion of modern industrial waste is disposed by solidification in cement and slags. Cement has been found to be effective for some heavy metals while ineffective for others. There is a strong need for a better solidification/stabilization matrix that can help solve the hazardous waste disposal problem. Herein, the waste/cement matrix is improved by adding a polymer additive to the matrix. The polymer enhances the encapsulation and penetration of the cement system into the interstitial spaces of the waste. To make the process more economically feasible, the source of polymer was lignin obtained from the large excess of bagasse produced each year from sugar cane processors. The studies were done with lead as the initial heavy metal waste source.

204. SOLID PHASE EXTRACTION OF THREE ORGANOPHOSPHORUS PESTICIDES IN WATER. B.B. Harvey and C.G. Beggs, Department of Chemistry, University of Colorado at Colorado Springs, Colorado Springs, Colorado 80918

Solid phase extraction (SPE) is fast becoming the method of choice for the isolation and purification of a variety of environmental compounds. Several factors must be considered when developing an efficient SPE technique including sorbent material, polarity of elution solvent, pH of analyte and conditioning solutions, and inclusion or exclusion of a wash step after sample application. We present a very efficient technique for the isolation of three organophosphorus pesticides in water at ppm concentrations: fenthion, fenchlorphos, and dyfonate. Quantitation was performed with gas chromatography/mass spectrometry.

205. CAUSTIC DEMAND DETERMINATION OF HANFORD TANK WASTE, Kevin L. Marshall, Department of Chemistry, Eastern Oregon State College, La Grande OR 97850-2899, Jon W. Ball, Westinghouse-Hanford Co., P.O. Box 1970, Richland WA 99352.

The 177 underground waste tanks at Hanford, which contain high level radioactive waste, may corrode and leak if the waste becomes acidic. One way to minimize corrosion is to maintain a sufficient concentration of free hydroxide (>0.01 molar) in the tank waste. If the tank is buffered, caustic must be added to achieve this minimum concentration. Determining how much caustic to add, however, is not a trivial task due to the complexity of the waste. Therefore, a procedure was developed to determine the amount of caustic required to reach a desired free hydroxide concentration. The procedure had an accuracy of 98.6% with precision of ±2.1%. The detection limit was found to be 0.0022 moles of OH- consumed per liter of buffer. The procedure was applicable to a wide range of concentrations.

206. COMPARATIVE ALKALI WASHING OF SIMULATED RADIOACTIVE SLUDGE. Glenn A. Fugate and Dale D. Ensor, Chemistry Department, Tennessee Technological University, Cookeville, TN 38505, and B. Z. Egan, Chemical Technology Division, Oak Ridge National Laboratory*, Oak Ridge, TN 37831-6223.

The treatment of large volumes of radioactive sludge generated from uranium and plutonium recovery processes is a pressing problem in the environmental restoration currently planned at various U.S. Department of Energy sites. This sludge, commonly stored in underground tanks, is mainly in the form of metal oxides or precipitated metal hydroxides and the bulk of this material is nonradioactive. One method being developed to pretreat this waste takes advantage of the amphoteric character of aluminum and other nonradioactive elements. Previous studies have reported on the dissolution of eleven elements from simulated sludge using NaOH solutions up to 6M. This work provides a comparative study using KOH. The effectiveness of the alkali washing as a treatment method to reduce the bulk of radioactive sludge requiring long term isolation will be discussed.

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207. Palladium and Anaerobic Bacteria Catalyzed Bioremediation. Joshua C. Sysak, Duquesne University, Chem. Dept., Pittsburgh, PA 15282-1503.

Zero-valent iron in combination with palladium have been observed to effect the decomposition of alkyl and aromatic halides with the reduction to the corresponding hydrocarbon. The reaction is of interest because it is an effective means of bioremediation of soil contaminated with chlorinated hydrocarbons and other environmentally sensitive halides. Palladium and iron had an advantage over iron in eliminating inorganic precipitates. These solid materials could present problems with in situ sedimentary bioremediation experiments. This work investigates the effects of anaerobic bacteria in conjunction with palladium on the methanogenesis of various biomasses. The palladium-iron-bacterial combination catalyzed the methyl coenzyme M reductase system. Studies were also carried out with platinum; however, no methane production was observed.

208.

INVESTIGATION OF LEAD LEVELS IN THE SOIL, LAKE SEDIMENT AND WATER IN THE BELTON LAKE RECREATIONAL AREA

Michael L. Angel, Darrell G. Watson, Department of Chemistry, University of Mary Hardin-Baylor, Belton, Texas, 76513

Samples of soil, lake sediment and water were collected from numerous sites in the Belton Lake Recreational Area located in Central Texas. These sites included both high use sites such as boat docks and fishing marinas and relatively remote and isolated areas of the lake. These samples were analyzed for lead in the parts per billion range using a Perkins Elmer 3110 Atomic Absorption Spectrometer equipped with a model HGA-600 graphite furnace.

209. ELECTROKINETIC REMEDIATION OF SOIL CONTAMINATED WITH OILFIELD BRINE. Chad Davis and Thomas Harris, Department of Chemistry, University of Tulsa, Tulsa, OK 74104.

The contamination of soil with brine (salt water) is a common environmental problem associated with the onshore production of oil. The use of electrokinetic remediation to remove sodium chloride from soil is being investigated. Experiments are being conducted in a test cell that features a "well" containing a stainless steel electrode at either end. During an experiment distilled water is added incrementally to the cell, and that which accumulates in the wells is removed and analyzed. The removal of both chloride ion and sodium ion from the soil is enhanced at the anode well by the application of an applied potential. The addition of calcium sulfate to the soil eliminates the plugging off of soil porosity resulting from pH changes that occur in the vicinity of both electrodes.

210.

INVESTIGATION OF ALKALINE MINE DRAINAGE IMPACTED STREAMSIDE SOIL COMPOSITION FOR SELECT METALS USING EXTRACTION AND ACID DIGESTION TECHNIQUES. J.C.Styer, Dr.C. Fish, Department of Chemistry, Saint Vincent College, Latrobe, PA 15650.

The concentrations of Fe, Mg, Mn, Na, Ca, Zn and P were determined in soils that are adjacent to alkaline mine drainage impacted Four Mile Run in Latrobe, PA. The hypothesis stated: soils closer to the mine drainage will have higher extractable and total metal concentrations in an eroded zone closer to the stream than soils in an uneroded zone